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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOSHIO KAJIYA
and HIROSHI TASAKI

Appeal 2009-009444
Application 10/521,370
Technology Center 1700

Before MICHAEL P. COLAIANNI, BRADLEY R. GARRIS, and
BEVERLY A. FRANKLIN, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL¹

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1 through 8. We have jurisdiction pursuant to 35 U.S.C. § 6.

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

We AFFIRM.

STATEMENT OF THE CASE

The subject matter on appeal is directed to a method of producing a cathode material for a lithium secondary cell. Claim 1 is illustrative:

1. A method of producing a cathode material for a lithium secondary cell, comprising the steps of preparing a solution selected from the group consisting of an alkaline solution, a carbonate solution, and a hydrogen carbonate solution, with either an oxide or a carbonate of a metal, as the major component of the cathode material for the lithium secondary cell, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, as the major component, subsequently preparing a mixture by mixing either the oxide or the carbonate of the metal, as the major component, with the compound of the other element, precipitated and bonded thereon, with a lithium compound, and firing the mixture.

The Examiner maintains the following rejections:

1) Claims 1-5 and 8 under 35 U.S.C. § 103(a) over Fujino (US 2002/0197202 A1, issued Dec. 26, 2002) and Horowitz (US 4,101,716, issued Jul. 18, 1978); and

2) Claims 6 and 7 under 35 U.S.C. § 103(a) over Fujino, Horowitz, and Kumta (US 6,017,654, issued Jan. 25, 2000).

With respect to rejection (1), Appellants focus their arguments on features recited in claim 1 only. (App. Br. 2-5 and Reply Br. 1-3). With respect to rejection (2), Appellants provide no additional argument for this rejection and instead refer to arguments made regarding the rejection of claim 1 in rejection (1). (App. Br. 5 and Reply Br. 1-3). Therefore, claims 6 and 7 under rejection (2) stand or fall with our decision regarding the rejection of claim 1 in rejection (1).

ISSUE

Did the Examiner err in determining that Fujino and Horowitz would have rendered obvious a method of producing a cathode material having the steps arranged in the order required by claim 1? We decide this issue in the negative.

FINDINGS OF FACT (FF)

We adopt the Examiner's findings in the Answer and Final Office Action as our own, except as to those findings that we expressly overturn or set aside in the Analysis that follows. We add the following factual findings:

1. The Specification discloses the claimed invention, which may be a lithium-manganese oxide complex, provides "excellent initial capacity, cycle characteristics, and safety." (Spec. 1 and 9).
2. The Specification discloses that the step of precipitating a doping element on the surface of a compound of a metal, as the major component of a cathode material for a lithium secondary cell, produces a "very high doping uniformity with a minimum ununiformity in doping." (Spec. 4 and 8). The Specification discloses that the "dopant element (the other element)" may be a transition metal such as cobalt. (Spec. 5 and 8). The Specification discloses that the "manganese oxide [may be used] as the major component of a lithium-manganese oxide complex-based cathode material for a lithium secondary cell." (Spec. 6).
3. The Specification, in one embodiment, discloses that the firing step is performed at 750 °C for 10 hours. (Spec. 9).

4. Fujino teaches forming a cobalt-coated lithium manganese complex oxide via the steps of 1) forming manganese oxide; 2) mixing the manganese oxide with a lithium compound and then sintering to form a lithium manganese complex oxide; 3) oxidizing the lithium manganese complex oxide particles in an aqueous alkali solution and a cobalt compound, which may be cobalt sulfate, so that a cobalt oxide epitaxially grows on the lithium manganese complex oxide; and 4) collecting the resultant precipitate by filtration, purification and drying. (Fujino, ¶¶ [0029]-[0042] and [0074]). Fujino teaches sintering (i.e., firing) the lithium manganese complex at a temperature that "is preferably in the range of from 650 to 850 °C" and that "[t]he sintering time is ordinarily 2 to 20 hours." (Fujino, ¶¶ [0065]-[0066] and [0076]).

5. Fujino teaches that

the present inventors have found out that coating the lithium manganese complex oxide with a cobalt oxide, which is a chemically stable substance having a lattice constant close to that of the lithium manganese complex oxide, makes it possible to remarkably improve the cycle characteristics without causing a serious reduction of the battery capacity.

(Fujino, ¶ [0047]).

Additional findings of fact may appear in the Analysis that follows.

PRINCIPLES OF LAW

"[A]nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the

inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Selection of the order of mixing ingredients is within the level of skill of the one of ordinary skill in the art and would have been obvious absent proof that the order of the steps produced any new or unexpected result. *In re Burhans*, 154 F.2d 690, 692 (CCPA 1946).

ANALYSIS AND CONCLUSION

With respect to rejection (1), Appellants argue that none of the applied prior art references teaches or would have suggested the claimed steps because, for example, Fujino teaches a process of forming a cobalt-coated lithium manganese complex oxide by, *inter alia*, epitaxially growing *cobalt oxide* on the surface of a *lithium* manganese complex oxide. (App. Br. 4 and 5). In addition, Appellants argue that

the product lithium manganese complex oxide of Fujino et al is not obtained by a firing process as is required by Horowitz et al. As such, firing to obtain a product oxide and then continued firing as is required by Horowitz et al would not be applied by one of ordinary skill in the art to Fujino et al since the product lithium manganese complex oxide is obtained without firing.

(App. Br. 5).

With respect to Appellants' argument Fujino that does not teach the claimed steps, Appellants' argument is unpersuasive of reversible error because it fails to address and thus fails to show error in the Examiner's stated rejection based upon, *inter alia*, reordering the sequence of Fujino's steps to arrive at the claimed steps.

In this regard, Appellants do not specifically dispute the Examiner's finding that

Fujino et al. teach forming the lithium complex oxide, specifically lithium manganese oxide, and then doping the lithium manganese oxide with cobalt oxide by precipitating cobalt from cobalt sulfate in solution ([0028], [0034], [0041], [0076]). Fujino et al. also recognize that coating the surface of the lithium manganese oxide particles with cobalt oxide remarkably improves cycle characteristics of the battery ([0047]).

(*Compare* Ans. 7 with App. Br. 2-5 and Reply Br. 2 and 3). In other words, given the above, the Examiner finds that Fujino, like Appellants, teaches the following two steps: 1) adding a lithium compound to form a lithium manganese complex oxide (lithium manganese oxide complex) and 2) adding a cobalt compound, which may be cobalt sulfate (corresponding to the claimed salt of another element) in order to form a cobalt oxide (corresponding to the claimed compound of the other element) precipitate, which is epitaxially grown on the lithium manganese complex oxide (lithium manganese oxide complex), in order to improve cycle characteristics of the battery. (*See* FF 1, 2, 4, and 5).

Based on these teachings and the knowledge of one skilled in the art, the Examiner determines that it would have been obvious to one of ordinary skill in the art "to switch the steps so that the lithium is added to the manganese oxide after the precipitation step . . . [i.e., precipitating cobalt oxide from cobalt sulfate] instead of before (as is taught in Fujino et al.)" since reordering the sequence of ingredients to achieve the same results is within the skill level of one of ordinary skill in the art. (Ans. 7-8); *see also* *Burhans*, 154 F.2d at 692 and *KSR*, 550 U.S. at 418. This determination

remains unrefuted by Appellants. Thus, Appellants' arguments have not persuaded us of any reversible error in the Examiner's stated case.

Appellants next argue that "firing to obtain a product oxide . . . as is required by Horowitz et al would not be applied by one of ordinary skill in the art to Fujino et al since the product lithium manganese complex oxide is obtained without firing." While Fujino teaches forming a cobalt-coated lithium manganese complex oxide via, *inter alia*, a precipitation reaction, Appellants do not specifically dispute and thus fail to show error in the Examiner's stated rejection based on employing Horowitz's firing step to remove impurities from the mixed metal oxide. (*Compare* Ans. 4 with App. Br. 5 and Reply Br. 2 and 3).

Moreover, contrary to Appellants' argument that Fujino obtains the "product lithium manganese complex oxide . . . without firing," Fujino, like Appellants, teaches sintering (i.e., firing) the metal oxide complex at a temperature "in the range of from 650 to 850°C" for "2 to 20 hours." (FF 4 and 5; *see also* FF 3). Accordingly, Appellants' arguments are unpersuasive of reversible error.

As a final point, we note that Appellants base no argument upon objective evidence of non-obviousness, such as the claimed order of the steps provides unexpected results.

Thus, it follows that the Examiner did not err in determining that Fujino and Horowitz would have rendered obvious a method of producing a cathode material having the steps arranged in the order required by claim 1.

ORDER

In summary, rejections (1) and (2) are sustained.

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Accordingly, the Examiner's decision is affirmed.

TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(2009).

AFFIRMED

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